
Passiflora inca, a New Species of Passifloraceae from Peru and Bolivia

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ABSTRACT. *Passiflora inca*, a new species from Peru and Bolivia, from the Vilcabamba–Amboró corridor, is described. An illustration, photographs of the flower, and SEM photos of the indument and leaf details are presented. The new species differs from the other species of the *Passiflora lobbii* group in usually multiflowered inflorescences and diffuse laminar nectaries (only known from *P. lobbii* subsp. *ayacuchoensis* within the species group).

RESUMEN. Se describe *Passiflora inca* una especie nueva del corredor Vilcabamba–Amboró de Perú y Bolivia. Se presenta una ilustración y fotografías de la flor y fotos de microscopio electrónico de barrido del indumento y de detalles de las hojas. La especie nueva difiere de las demás especies del grupo *Passiflora lobbii* en tener inflorescencias multifloras y nectarios laminares difusos (solamente conocidos en *P. lobbii* subsp. *ayacuchoensis* en el grupo).

Key words: Andes, Bolivia, endemic, *Passiflora*, Passifloraceae, Peru, Vilcabamba–Amboró corridor.

The genus *Passiflora* L. contains about 500 species in the New World. The largest concentration of species is found in the Andes, and many species are endemic to “hotspots” (regions that contain great diversity of endemic species and are significantly impacted by human activities) in the Tropical Andes. The species we describe here grows exclusively within the so-called Vilcabamba–Amboró corridor “hotspot.” Six collections from southern Peru and the Bolivian Andes revealed this new species belonging to the *Passiflora lobbii* Masters group in subgenus *Decaloba* DC. (Skrabal et al., 2001). The *Passiflora lobbii* group is found from southern Ecuador to northern Bolivia and consists of nine species. Six species (viz. *P. callacallensis* Skrabal & Weigend, *P. podlechii* Skrabal & Wei-

gend, *P. sanchezii* Skrabal & Weigend, *P. sagastegui* Skrabal & Weigend, *P. solomonii* L. K. Escobar, and *P. tesserula* Skrabal & Weigend) can be characterized as narrowly endemic species (Skrabal et al., 2001). The remaining three species have a broader distribution: *P. exoperculata* Masters, disjunct in southern Ecuador and northern Bolivia (Holm-Nielsen et al., 1988; Skrabal et al., 2001); *P. lobbii*, with its three subspecies in central Peru (Skrabal et al., 2001); and the species described here from southern Peru and neighboring Bolivia.

***Passiflora inca* P. Jørgensen, sp. nov.** TYPE: Peru. Cusco: La Convención, road from Cusco to Quillabamba, after pass Abra Malaga and before Ipal, 2600–2700 m, 13°4'S, 72°22'W, 24 Feb. 2000, M. & K. Weigend 2000/426 (holotype, USM; isotypes, HUT, MO, MSB, NY). Figures 1, 2.

A *Passiflora exoperculata* inflorescentis multifloris, paninis abaxialibus foliorum pubescentibus, foliis glandulis duabus vel pluribus inter costam et nervos laterales praeditis recedit.

Vine, pubescent throughout except for certain floral parts and the glabrescent adaxial lamina surface, trichomes simple, straight and translucent, white or slightly yellow; stem cylindrical or angled when young, becoming angled and grooved with age and gradually losing some of its pubescence; internodes 1.6–5.6 cm long. Stipules 4.5–6 mm long, aristate, early deciduous; axillary buds covered by two prophylls; petiole 0.6–1.8 cm long, caniculate, 2 auricular glands at the middle (Bolivia) or at apex (Peru); lamina 2.1–6.3 × 3.9–7.2 cm, intermediate between transverse obtriangular and transverse rectangular in outline, coriaceous, base truncate to cordate, slightly lustrous above, in mature leaves pubescence present above only along primary nerves (diminishing toward the margin) and hispi-

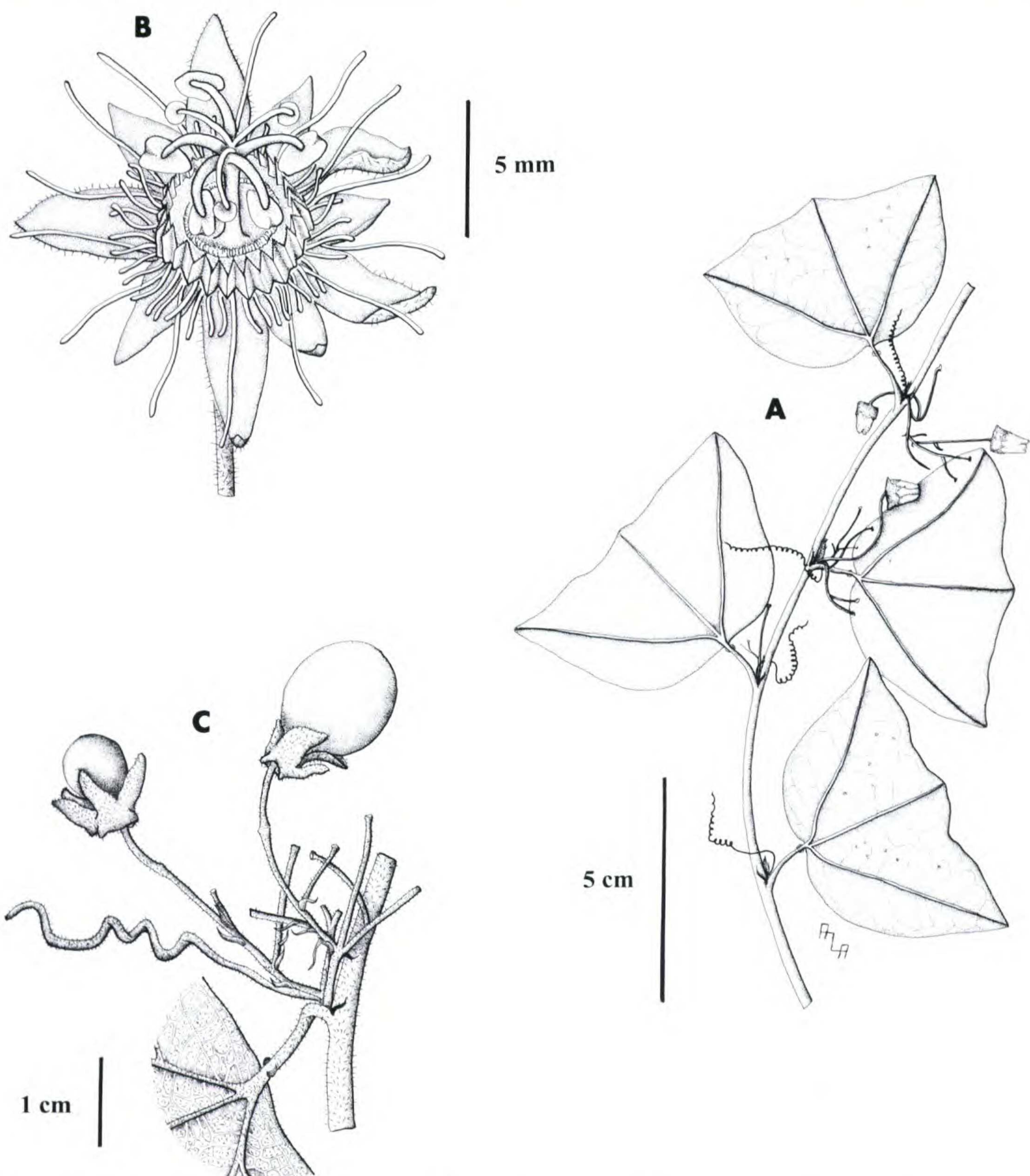


Figure 1. *Passiflora inca* P. Jørgensen.—A. Habit. —B. Flower. —C. Infructescence and fruit. (*M.* & *K.* Weigend 2000/426, MO isotype.)

dulous along the margin, dull below, margin entire and slightly revolute, trinerved, branching occurs a few mm from the leaf base, each primary nerve ending in a distinct mucro, venation outside the lateral nerves brochidodromous, between primary nerves camptodromous and reticulate, the veins slightly raised above and strongly raised below, where they intersect often flattened and covering small sections of the lamina, lateral nerves divaricate to oblique at an angle of 72° – 97° , 2 to 5 small

glands formed on secondary or tertiary veins between midvein and lateral nerves. Flowers light green to green with a dark purple corona or black central ring, in two 1- to 6-flowered cymes per axil; bracts 1.3 – 1.9×0.2 – 0.3 mm, aristate, occasionally split subapically in two or three; peduncles (to first branch) 7–11 mm; floral stipe 4–6 mm (Bolivia) or 7–11 mm (Peru); hypanthium (5)–6–7 mm diam., patelliform, pentagonal with small spurs in the corners of the sepals; sepals 5.7 – 6.2×1.8 – 2.0



Figure 2. Photographic plate of *Passiflora inca*. —A. Leaf, abaxial surface, with darker areas around the laminar nectaries. —B. Immature and mature fruit. —C. Flower, frontal view. —D. Flower, lateral view. —E. Adaxial surface of young leaf with sparse cover of simple trichomes (SEM). —F. Abaxial leaf surface of young leaf with dense cover of simple trichomes (SEM). —G. Mucronate leaf tip, abaxial surface of young leaf (SEM). —H. Indistinct nectary on abaxial leaf surface. Note the slightly dome-shaped nectary at the junction of the leaf veins; in the living plant the nectaries are dark brown and thus clearly set off from the pale green abaxial surface (SEM). (M. & K. Weigend 2000/426.)

mm, narrowly oblong to narrowly ovate, abaxial central part pubescent, margin broadly hyaline and glabrous, not awned; petals $3.8\text{--}4.2 \times 1.4\text{--}1.6$ mm, narrowly ovate, hyaline, glabrous; outer coronal series 4.5–5.2 mm, with few members, filiform or filiform with a clavate apex; inner corona series 1.5–2 mm, more numerous, filiform with a clavate and papillate apex, occasionally up to 4 filaments irregularly fused; operculum 1.6–1.7 mm high, plicate with ciliate margin; limen present; androgynophore 2.3–2.6 mm; staminal filaments fused for yet another 2 mm until the top of the ovary and surrounding the ovary, free part of filaments 2.5–2.7 mm, linear; thecae $2.1 \times 1\text{--}1.3$ mm; ovary 1.9×1.1 mm, obovoid, glabrous; styles 2.6 mm, filiform; stigma 0.75–1.2 mm diam., capitate. Fruit $10\text{--}14.5 \times 9\text{--}10.3$ mm, subspherical, dark blue with light waxy bloom; seeds asymmetric, chalazal beak inclined toward the raphe, irregularly pitted near base, pits arranged in rows toward the micropyle, ca. 45 pits.

Etymology. The species is named after the Inca culture, which still is prevalent at the type locality, the Urubamba valley, and had its cultural center, Machupichu, close to the type locality.

Distribution and habitat. *Passiflora inca* is a cloud forest species and has been found twice in the Urubamba valley, the northern part of the Vilcabamba ridge, in Peru; once in the Chimu Valley in the Cordillera de Quinza Cruz, and three times in the valley of río Espiritosanto between the Cordilleras Cochabamba and Tiraque in Bolivia. It is one of the four eastern slope taxa of the *Passiflora lobbii* group (together with *P. callacallensis*, *P. lobbii* subsp. *ayacuchoensis* Skrabal & Weigend, and *P. exoperculata*); the other taxa are from at least seasonally dry habitats. Minimum and maximum elevation for all labels are 2300 and 4150 m respectively, but we believe that a range of 2500–2900 m is more realistic. *Passiflora inca* is extremely abundant in the secondary vegetation at the type locality and forms hanging curtains over the road cutting.

Phenology. The species has been collected from February 4 to July 25 in bud, flowers, and with young to almost mature fruits. There were numerous mature fruits on the plants at the type locality.

Diagnostic characters and possible relationships. Three of the paratypes cited below (Besse et al. 1859, Lewis 38638, and Beck 4008) were included in the citations of specimens for *P. exoperculata* in Skrabal et al. (2001). They probably contributed significantly to the broadening of the *P.*

exoperculata concept and are potentially the specimens that triggered comments like “abaxial lamina . . . pilose only in . . . some Bolivian specimens” and “the southern populations are morphologically more variable in leaf shape, pilosity, and number of flowers per axil.” Not only do these quotations show that there is morphological similarity between *P. inca* and *P. exoperculata*, they also serve to list some of the characters that distinguish the two species. *Passiflora inca* keys out to *P. exoperculata* in Skrabal et al. (2001) but is distinguishable by a multiflowered inflorescence, pubescence on the lamina surface, and the laminar glands. This last character can be particularly emphasized as it is observed only in *P. lobbii* subsp. *ayacuchoensis* within the *P. lobbii* group.

The most striking feature of *Passiflora inca* is, however, its multiflowered inflorescences, which clearly distinguish it from all other members of the group. Occasionally it is reduced to a single flower as it is seen in most axils on Besse et al. 1859, Kessler & Kelschebach 245, and Beck 4008; the last collection is the only collection where we have not found a single branched inflorescence. A similar pattern is known from the only distantly related *P. sexflora* Jussieu, where some populations in Central America and Ecuador have inflorescences reduced to a single flower. Potentially this new species could mark a connection between the *P. lobbii* group and the species surrounding *P. sodiroi* Harms (including *P. monadelpha* P. Jørgensen & Holm-Nielsen and *P. ursina* Killip & Cuatrecasas). Characters of that group that may be homologous and indicate relationship are the multiflowered inflorescences; a raised reticulate venation pattern found in *P. sodiroi*; the subtle formation of spurs and similar laminar nectaries found in *P. monadelpha*, and *P. ursina*, and more prominently developed in *P. sodiroi*; and the wilted flowers that persist below the fruit until it matures in all the mentioned species. The two last characteristics, wilted flower persisting below the developing fruit and the formation of small spurs in the corners between the sepals, are found also in several taxa in the *P. lobbii* group to varying degree. We have observed spurs in *P. lobbii*, *P. podlechii*, *P. callacallensis*, *P. sanchezii*, *P. sagasteguii*, *P. exoperculata*, and *P. inca*. The only species where this characteristic seems to be completely absent is in *P. tesserula*. We have seen fruits with remains of the wilted flower in *P. lobbii*, *P. sagasteguii*, *P. exoperculata*, and *P. inca*. The fused filaments, beyond the base of the ovary, is also a very unusual character found also in *P. monadelpha*.

Paratypes. PERU. CUSCO: Urubamba, a 88 y 112 km de Cusco, Santuario Histórico de Machupichu y el Camino Inca, 13°9'S, 72°31'W, 2300–4150 m, P. Nuñez & F. Luna 8874 (CUZ, MO). BOLIVIA. LA PAZ: Province of Inquisivi, Valle de Chimu, on the slopes W of Pavionani fork of the río Chimu, 1–3 km NW of Estancia Chimu, 7 km NE of Choquetanga, 16°48'S, 67°16'W, 2900–3200 m, 14 Apr. 1991, M. Lewis 38638 (LPB, MO). COCHABAMBA: Province of Chapare, km 72 Cochabamba–Villa Tunari, 2500 m, 4 Feb. 1983, L. Besse et al. 1859 (MO); Province of Chapare, road to Chapare, turnoff towards Vinto, Hydroelectric plant Corani, 1 km from main road, 2500 m, 5 June 1980, S. G. Beck 4008 (LPB, MO); Province of Chapare, Hydroelectric plant Corani, 61.4 km from Cochabamba towards Chapare, 2750 m, M. Kessler & M. Kelschebach 245 (GOET, LPB).

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Literature Cited

Holm-Nielsen, L. B., P. M. Jørgensen & J. E. Lawesson. 1988. 126. Passifloraceae In: G. Harling & B. Sparre (editors), Flora of Ecuador 31: 1–130.
Skrabal, J., H.-J. Tillich & M. Weigend. 2001. A revision of the *Passiflora lobbii* group (Passifloraceae) including some new species and subspecies. Harvard Pap. Bot. 6(1): 309–338.